

In the embodiment of the invention illustrated in FIGS. 1-7, the horn switch 58 is connected with a source of electrical energy and ground through conductors 60 and 62 and a connector 63. In the embodiment illustrated in FIG. 8, the horn switch is connected directly to ground. Since the embodiment of the invention illustrated in FIG. 8 is generally similar to the embodiment of the invention in FIGS. 1-7, similar numerals will be utilized to designate similar components, the suffix letter "a" being associated with the numerals of FIG. 8 to avoid confusion.

A horn switch 58a (FIG. 8) has first and second spaced tear seams 64a and 65a along which the horn switch ruptures upon inflation of an air bag. The tear seams 64a and 65a in the horn switch 58a are aligned with tear seam central portions 50 and 49 in the inner and outer covers 34 and 36. The switch 58a includes a pair of generally flat, flexible overlying layers of electrically conductive material, one of which is shown in FIG. 8, that have substantially the same construction as the layers 70 and 72 of FIGS. 1-7. An envelope 120a of electrically insulating material encloses the layers of electrically conductive material. A plurality of openings 140a in the horn switch 58a receive fasteners for connecting the horn switch to the inner cover 34.

The horn switch 58a is connected with a source of electrical energy, such as a vehicle battery, through conductor 160 and a connector 163. The connector 163 may also connect the source of electrical energy with the inflator. The switch 58a is connected with ground through conductor 162. The conductor 162 is enclosed by the envelope of electrically insulating material 120a. An opening 140a extends through the conductor 162 for connecting the horn switch to the inner cover.

An end portion 166 of the conductor 162 is connected to an electrically conductive ring 168. The ring 168 receives a fastener, such as a bolt, for connecting and causing the ring 168 to engage a ground of another circuit or a ground plate.

Alternatively, the end portion 166 of the conductor 162 may have an opening extending therethrough for receiving a fastener to connect the conductor 162 to ground. The end portion 166 has at least one side exposed or not enclosed by the envelope 120a. Preferably, the end portion 166 is made of a highly conductive material, such as copper, and possibly may have a ring made of a highly conductive material attached thereto.

Although each of the layers 70 and 72 has been disclosed as having only one interconnecting portion, it is contemplated that each layer could have two interconnecting portions. The interconnecting portions of one layer would be aligned with the interconnecting portions of the other layer. Therefore, the two layers 70 and 72 would have the same shape.

From the above description of the invention, those skilled in the art will perceive improvements, changes and modifications. Such improvements, changes and modifications within the skill of the art are intended to be covered by the appended claims.

Having described the invention, the following is claimed:

1. An apparatus for enclosing an air bag on a steering wheel of a vehicle having a horn, said apparatus comprising:

an inner cover having a first wall at least partially enclosing the air bag and including means for defining a first tear seam which extends across said first wall and along which said inner cover ruptures upon inflation of the air bag to enable deployment of the air bag;

an outer cover having a second wall at least partially enclosing said inner cover and the air bag and including

means for defining a second tear seam which extends across said second wall and along which said outer cover ruptures upon inflation of the air bag to enable deployment of the air bag; and

a horn switch disposed between said inner and outer covers for effecting operation of the horn, said horn switch including first and second overlying layers of electrically conductive material and first and second tear seams in said horn switch along which said horn switch ruptures upon inflation of the air bag to enable deployment of the air bag, said first and second tear seams in said horn switch being aligned with said first and second tear seams in said inner and outer covers and having a combined length less than the length of each of said first and second tear seams in said inner and outer covers.

2. An apparatus as set forth in claim 1 wherein said horn switch includes first and second portions located on opposite sides of said first and second tear seams in said horn switch and a pair of spaced apart interconnecting portions interconnecting said first and second portions, said interconnecting portions including said first and second tear seams in said horn switch.

3. An apparatus as set forth in claim 1 wherein said horn switch includes first and second layers of electrically conductive material, each of said first and second layers having portions located on opposite sides of said first and second tear seams in said inner and outer covers and electrically conductive portions interconnecting said portions located on opposite sides of said first and second tear seams in said inner and outer covers.

4. An apparatus as set forth in claim 3 wherein said horn switch includes an envelope of electrically insulating material enclosing said first and second layers of said horn switch.

5. An apparatus as set forth in claim 4 wherein said envelope includes surface means for defining a plurality of openings for receiving fasteners to connect said horn switch to one of said inner and outer covers.

6. An apparatus for enclosing an air bag on a steering wheel of a vehicle having a horn, said apparatus comprising:

an inner cover at least partially enclosing the air bag and including means for defining a first tear seam in said inner cover along which said inner cover ruptures upon inflation of the air bag to enable deployment of the air bag;

an outer cover at least partially enclosing said inner cover and the air bag and including means for defining a second tear seam in said outer cover along which said outer cover ruptures in response to inflation of the air bag to enable deployment of the air bag; and

a horn switch disposed between said inner and outer covers for effecting operation of the horn, said horn switch including first and second overlying layers of electrically conductive material, said first layer including a first portion with a first tear line aligned with said first and second tear seams in said inner and outer covers, said second layer including a second portion spaced apart from said first portion with a second tear line aligned with said first and second tear seams in said inner and outer covers and spaced apart from said first tear line along a line extending along said first and second tear lines, said horn switch being rupturable along said first and second tear lines upon inflation of the air bag.

7. An apparatus as set forth in claim 6 wherein said first and second tear lines have a combined length less than a length of said first tear seam in said inner cover.

8. An apparatus as set forth in claim 6 wherein said horn switch includes an envelope of electrically insulating material extending around said first and second layers of said horn switch, said envelope including a first portion extending around said first portion of said first layer and a second portion spaced from said first portion extending around said second portion of said second layer.

9. An apparatus for enclosing an air bag on a steering wheel of a vehicle having a horn, said apparatus comprising:

an inner cover having a first wall at least partially enclosing the air bag, said first wall being movable upon deployment of the air bag;

an outer cover having a second wall at least partially enclosing said inner cover and the air bag and including means for defining a tear seam which extends across said second wall and along which said outer cover

8

ruptures upon inflation of the air bag to enable deployment of the air bag; and

a horn switch disposed between said inner and outer covers for effecting operation of the horn, said horn switch including first and second overlying layers of electrically conductive material and an envelope of electrically insulating material enclosing said first and second layers, said horn switch including a tear seam along which said horn switch ruptures upon inflation of the air bag to enable deployment of the air bag.

10. An apparatus as set forth in claim 9 wherein said tear seam in said horn switch is aligned with said tear seam in said outer cover.

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11. An apparatus for enclosing an air bag on a steering wheel of a vehicle having a horn, said apparatus comprising:

a cover wall having a tear seam along which said cover wall ruptures upon inflation of the air bag to enable deployment of the air bag; and

a horn switch including first and second overlying layers of electrically conductive material and having first and second tear seams along which said horn switch ruptures upon inflation of the air bag to enable deployment of the air bag, said first and second tear seams in said horn switch being aligned with said tear seam in said cover wall and having a combined length less than the length of said tear seam in said cover wall.

12. An apparatus as set forth in claim 11 wherein said horn switch includes first and second portions located on opposite sides of said first and second tear seams in said horn switch and includes a pair of spaced apart interconnecting portions interconnecting said first and second portions, said interconnecting portions including said first and second tear seams in said horn switch.

13. An apparatus as set forth in claim 11 wherein each of said first and second layers of electrically conductive material has portions located on opposite sides of said tear seam in said cover wall and has portions interconnecting said portions located on opposite sides of said tear seam in said cover wall.

14. An apparatus as set forth in claim 13 wherein said horn switch includes an envelope of electrically insulating material enclosing said first and second layers of electrically conductive material.

15. An apparatus as set forth in claim 14 wherein said envelope includes surfaces defining openings for receiving fasteners to connect said horn switch to said cover wall.

16. An apparatus for enclosing an air bag on a steering wheel of a vehicle having a horn, said apparatus comprising:

a cover wall having a tear seam along which said cover wall ruptures in response to inflation of the air bag to enable deployment of the air bag; and

a horn switch including first and second
overlying layers of electrically conductive material,
said first layer including a first portion with a first
tear line aligned with said tear seam in said cover
wall, said second layer including a second portion
which is spaced apart from said first portion and which
has a second tear line aligned with said tear seam in
said cover wall, said second tear line being spaced
apart from said first tear line along a line extending
along said first and second tear lines, said horn
switch being rupturable along said first and second
tear lines upon inflation of the air bag.

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17. An apparatus as set forth in claim 16 wherein
said first and second tear lines have a combined length
less than the length of said tear seam in said cover
wall.

18. An apparatus as set forth in claim 16 wherein
said horn switch includes an envelope of electrically
insulating material extending around said first and
second layers of electrically conductive material, said
envelope including a first portion extending around
said first portion of said first layer and including a

second portion which is spaced from said first portion
and which extends around said second portion of said
second layer.

19. An apparatus for enclosing an air bag on a
steering wheel of a vehicle having a horn, said
apparatus comprising:

a cover wall having a tear seam along which
said cover wall ruptures upon inflation of the air bag
to enable deployment of the air bag; and

a horn switch covered by said cover wall and
including first and second overlying layers of
electrically conductive material and an envelope of
electrically insulating material enclosing said first
and second layers, said horn switch including a tear
seam along which said horn switch ruptures upon
inflation of the air bag to enable deployment of the
air bag.

20. An apparatus as set forth in claim 19 wherein
said tear seam in said horn switch is aligned with said
tear seam in said cover wall.

21. An apparatus for enclosing an air bag on a steering wheel of a vehicle having a horn, said apparatus comprising:

a cover wall having a tear seam along which said cover wall ruptures upon inflation of the air bag to enable deployment of the air bag; and

a horn switch including first and second overlying layers of electrically conductive material, said horn switch having first and second major portions located on opposite sides of said tear seam in said cover wall and having a minor portion interconnecting said first and second major portions, said minor portion being configured to rupture under pressure applied by the air bag upon inflation of the air bag.

22. An apparatus as set forth in claim 21 wherein each of said first and second layers of electrically conductive material has major portions located on opposite sides of said tear seam in said cover wall and has a minor portion interconnecting said major portions, said minor portion of said horn switch comprising said minor portions of said layers.

23. An apparatus as set forth in claim 22 wherein
said minor portion of said horn switch is one of a
plurality of minor portions of said horn switch which
are alike and which are spaced apart in a direction
parallel to said tear seam in said cover wall.